WHAT IS CLAIMED IS:

1. A tray drive mechanism for an optical disc apparatus, comprising:

a base chassis;

a tray for placing an optical disc therein and loading the optical disc into an optical disc apparatus, the tray being provided and slidable in the optical disc apparatus to open and close, and having a rack to be provided with a driving force for the opening and closing;

an optical pickup to irradiate a laser beam onto the optical disc for recording and/or reproducing signals or data;

a feed motor for feeding the optical pickup in a radial direction of the optical pickup;

a gear train to be driven by the feed motor to rotate and comprising plural gears which include a feed gear to mesh with a rack provided on the optical pickup for feeding the optical pickup and also include a tray drive gear to mesh with the rack of the tray for opening and closing the tray;

a drive mechanism chassis having mounted thereon the optical pickup, the feed motor, the feed gear and a switching mechanism for switching operation from a feeding operation of the optical pickup to a clamping and unclamping operation of the optical disc;

a rack member comprising a boss and being provided to mesh with the feed gear and driven in a direction to inner circumference of the optical disc;

a plate member comprising a boss and a cam groove comprising a slope portion, the boss of the rack member being provided to transfer a

driving force to the plate member, wherein the slope portion of the cam groove of the plate member meshes with the boss of the rack member when the rack member is driven in the direction to the inner circumference of the optical disc; and

a cam slider slidably supported by the base chassis of the optical disc apparatus, the boss of the plate member being provided to transfer a driving force to the cam slider, wherein the cam slider comprises a cam groove to guide the boss of the plate member for raising and lowering the drive mechanism chassis so as to clamp and unclamp the optical disc, and comprises a boss to guide the tray, and also comprises a rack to mesh with the tray drive gear,

wherein the tray comprises a cam groove comprising a slope surface to be engaged with the boss of the cam slider for moving the tray in a direction to open and close the tray when the cam slider is slided,

wherein when the rack member is driven in a direction to the inner circumference of the optical disc, the cam slider is slided in linkage with the plate member to cause the rack of the cam slider to mesh with the tray drive gear, and

wherein the mesh between the rack of the cam slider and the tray drive gear causes driving of the cam slider to be switched from driving by the plate member to driving by the tray drive gear so that the boss of the cam slider pushes the slope surface of the cam groove for sliding the tray to cause the rack of the tray to mesh with the tray dive gear, whereby the tray is driven by the feed motor to open and close.

2. The tray drive mechanism for an optical disc apparatus

according to claim 1, wherein the gear train includes gears which are matched in phase with each other in assembly.

3. The tray drive mechanism for an optical disc apparatus according to claim 1,

wherein the plate member further comprises, at the cam groove thereof, a boss restricting portion which extends in a direction approximately perpendicular to the feed direction of the optical pickup, and which restricts movement of the boss of the rack member in the feed direction in tray opening operation.

4. The tray drive mechanism for an optical disc apparatus according to claim 3,

wherein the optical pickup is biased by a spring member having one end contacted with the optical pickup and another end contacted with the rack member in the direction to the inner circumference of the optical disc.

5. The tray drive mechanism for an optical disc apparatus according to claim 3,

wherein the optical pickup further comprises a stopper portion to contact a portion of the rack member for restricting movement of the optical pickup in the feed direction when the optical pickup is positioned at an innermost circumference position thereof.

6. The tray drive mechanism for an optical disc apparatus according to claim 1, which further comprises an innermost position detection switch for detecting an innermost circumference position of the optical pickup, wherein completion of tray closing operation is detected by switching off of the innermost position detection switch.

7. The tray drive mechanism for an optical disc apparatus according to claim 1,

wherein the plate member further comprises a plate spring portion which can be elastically deformed in a direction perpendicular to sliding direction of the plate member, and

wherein the drive mechanism chassis further comprises a stopper rib to be engaged with the plate spring portion for restricting sliding movement of the plate member after the rack member is driven by the feed gear in the direction to the inner circumference of the optical disc so as to be separated from the feed gear.

8. The tray drive mechanism for an optical disc apparatus according to claim 1, wherein the plate member further comprises a rib-like wall portion to contact the boss of the rack member for restricting sliding movement of the plate member when the optical pickup is positioned at an inner circumference stop position in power supply off-state.

9. The tray drive mechanism for an optical disc apparatus according to claim 1,

wherein the plate member further comprises a plate spring portion which can be elastically deformed in a direction perpendicular to sliding direction of the plate member, and

wherein the drive mechanism chassis further comprises a stopper rib for the plate spring portion to ride on and contact in recording and reproducing operation or seek operation of the optical disc, thereby preventing the plate member from moving in the recording and reproducing operation or the seek operation.

10. The tray drive mechanism for an optical disc apparatus according to claim 1, wherein the plate member further has a gear fall-off prevention plate provided at an end thereof which is positioned above the gears constituting the gear train, and which partially overlaps the gears, as seen in a plan view, to prevent such gears from falling off.